

Amendments to the Drawings

New Figs. 4L and 4M are enclosed on a new sheet. No new matter has been added.

REMARKS

In response to the Office Action dated March 20, 2006, Applicants amended claims 102 and 123, and included new claims 126 – 153, fully supported by the original specification. New claims 126 – 153 are within the elected Group XII (pursuant to the Restriction Requirement). Applicants cancelled claims 1 – 101 and 105 – 115, in favor of a divisional application to be filed.

In the Office Action dated March 20, 2006, the Examiner objected to the drawings. Applicants included new Figs. 4L and 4M fully supported by the original specification, as explained in detail below. No new matter has been added.

Specifically, as described in the specification, “FIG. 4 is a side view and FIG. 5 a top view of a deposit head, comprising a deposit pin and an annular sub-reservoir, through which the deposit pin operates, while FIGS. 4A-4D depict a sequence of stages of the deposit action of the head of FIG. 4. FIG. 4E depicts supply or re-supply of the sub-reservoir of FIG. 4. FIG. 4F depicts cleaning the ring and pin of FIG. 4 at a cleaning station and FIG. 4G depicts drying the pin and ring. FIG. 4H depicts the narrow walls of the wells of a PCR plate and the supply of a sub-reservoir by immersion in a well. FIG. 4I is a cross-sectional view of a presently preferred annular sub-reservoir device suitable for picking up low viscosity fluids from such a narrow main supply as illustrated in FIG. 4H, while FIG. 4J is an end view of the device of FIG. 4I. FIG. 4K is a view similar to FIG. 4H of depositing dots of fluid on flat-bottomed wells of a conventional supply plate.” (Specification, page 22, lines 11 – 32)

Fig. 4L illustrates a sub-reservoir having a multi-turn helical shape 14B and being traversed by a deposit pin 12, and Fig. 4M illustrates a sub-reservoir formed by an open rectangular ring and being traversed by deposit pin 12. Figs. 4L and 4M also show a support rod 15, wherein the reference numerals correspond to the reference numerals shown in Figs. 4 – 4K.

In the Office Action dated March 20, 2006, the Examiner rejected claims 122 – 125 under 35 U.S.C. §112, first paragraph. Applicants respectfully disagree with these rejections for the following reasons.

The claimed aliquot carrier is described, for example, in connection with Figs. 4 – 4. On pages 33 - 34, the original specification discloses:

Referring now to FIGS. 4 and 5 a preferred mobile sub-reservoir for the biological fluid or reactant is shown, in the form of an annular ring. [0182] Deposit pin 12 is of diameter d selected in accordance with the size of the deposited dot desired. It is mounted in axi-symmetric relation to the sub-reservoir ring 14 that has a significantly larger internal diameter $d_{sub.1}$, such that a significant fluid space f_s exists between the pin and the inner periphery of the ring. As shown in FIG. 4E, the outer diameter d_2 of ring 14 is sized smaller than the well 19 of a central supply plate, 17, so that the ring can be immersed in it, for supply or resupply.

During the deposit sequence of FIGS. 4A-4D the ring 14 is held stationary by its support rod 15 while the pin 12 is moved by an associated driver (see e.g. driver 76, FIG. 6B) through a sequence of vertical positions. In the pickup position, the end 11 of pin 12 is drawn above the lower surface of the large fluid drop 13 that is held by capillary action within the internal annular surface of the ring 14. This is shown in FIG. 4A. The pin, for illustrative purposes, is shown withdrawn fully above the retained fluid 13, although that is not necessary.

As seen by comparison of FIGS. 4A and 4B, by downward movement of the pin tip from above the lower surface of the large fluid drop 13, to below that surface, the pin picks up a precisely sized drop F , which is then deposited in the sequence shown in FIGS. 4C and 4D.

At the resupply position of FIG. 4e, the annular ring 14 is moved downwardly by its support rod 15 for immersion in the well of the supply plate while the pin 12 remains stationary, at a higher elevation. At the cleaning and drying station the lower surfaces of the pin and ring are shown aligned in FIGS. 4F and 4G. At the washing station, FIG. 4F, the ring and pin may both be subjected to reciprocation in the vat of cleaning solution in the same or opposite vertical directions to assist the cleaning process, and at the drying stage FIG. 4G to assist in blotting against the absorbent layer A.

Wells of 96 well plates used for deposit of the restricted amounts of fluid resulting from PCR (polymerase chain reaction) present a particular problem in fluid transfer. Referring to FIG. 4H, wells 100 are made to hold extremely small volumes of fluid, typically 2 to 5 micro liter (1 micro liter=1 cubic mm). These wells are typically cone-shaped with the top diameter about 6 mm and the bottom shaped as a semisphere about 2 mm in diameter. Fluids even with low viscosity, for instance water, are so held by surface tension in such a well that volumes up to 15 micro liter can be held against gravity when the plate is inverted. Smaller amounts of such liquids are difficult to extract from such narrow wells due to the aggregation of surface tension, gravity, inertia and vacuum effects.

The description of the claimed aliquot carrier is provided also, for example, on page 40, lines 1 – 20, of the original specification:

In such embodiments the aliquot carrier rings 14 and pins 12 are spaced in the cluster at 9 mm center-to-center distances or multiples thereof. This arrangement facilitates operation with conventional "96 well plates" in which the wells are spaced at 9 mm on center intervals with 8 rows of 12 holes. Higher density plates also employ this configuration and have the same footprint but employ more holes, 16 x 24, with hole-to-hole distance of 9/2 mm, to provide "384 plates", an arrangement which enables use of the higher density plates with existing automated 96 well plate handling equipment. The system described can be employed with both types of plates, as well as any arbitrary arrangement.

The versatility of the cluster is illustrated by the following examples.

Sub-reservoir rings, e.g. set at 9 mm center-to-spacing, may be indexed in X, Y direction along with their pins and the rings driven down simultaneously for supply or resupply from four wells of a conventional 96 or 384 well plate.

As claimed in claims 122 -125, the fluid-retaining aperture is further described on page 55, lines 7 – 18, where the original specification discloses:

The mobile, local reservoir structure that preferably translates across the substrate with the deposit pin may have various advantageous forms such as axially adjacent circular rings, multi-turn helical shapes, closed cylinders, open rectangular rings, etc. The size of the opening or bore, as well as the size, for instance, of the wire or ribbon that forms the shape of the ring is selected in relation to the properties of the fluid (e.g. viscosity and surface tension), the number of deposits to be made from a given fluid charge in the reservoir ring, and the size of the deposit pin that is to move through the ring. (emphasis added)

Therefore, claims 122 – 125 are fully supported by the original specification and comply with the written description requirement.

The Examiner rejected claims 102 – 104 and 116-121 under 35 U.S.C. §102 as anticipated by US Patent 5,770,151 to Roach. Applicants respectfully disagree with these rejections

As claimed in claim 102, the present invention is directed to an aliquot carrier comprising a fluid-retaining aperture. The fluid-retaining aperture is constructed and cooperatively arranged with a deposit device so that the deposit device can transit the fluid-retaining aperture to pick up a drop of fluid to be deposited on a deposit surface.

The internal surfaces of the fluid-retaining aperture have a surface roughness that increases its wettability. This type of an aliquot carrier is not disclosed in US Patent 5,770,151 to Roach.

The teaching of US Patent 5,770,151 to Roach is directed to a microspot deposition system featuring a hollow cylindrical wall extending from a closed end, terminating in an open end and including a longitudinal gap extending from the open end toward the closed end of the cylindrical wall. The cylindrical wall defines a lumen with both the lumen and the gap adapted to facilitate capillary action of liquid in fluid communication therewith to form a meniscus proximate to the open end. Roach states that to facilitate deposition of liquid contained within the lumen, the gap may be tapered so that it is narrowest proximate to the open end. The narrowed portion of the gap results in a meniscus having a reduced area to ensure preferential fluid flow toward the open end, which facilitates deposition via capillary action between the liquid in the lumen and a working surface on which the liquid is to be deposited.

Roach does not disclose a deposit device that can transit a fluid-retaining aperture to pick up a drop of fluid to be deposited on a deposit surface by the deposit device. Furthermore, Roach does not disclose a pin that can transit the fluid-retaining aperture to pick up a drop of fluid, as claimed in dependent claims 116, 129, or 142.

Therefore, Roach discloses a completely different device than the device claimed in claim 102, or in the new independent claims 128 and 141. Claims 103, 104 and 116 – 127, and 129 - 153 are properly dependent on claim 102, 128 or 141. Accordingly, all these claims are clearly patentable and are thus in condition for allowance.

If the Examiner has any questions, or believes a telephone call will aid examination and advance prosecution of the application, he is respectfully invited to call the undersigned representative.

Please apply any charges or credits to the Deposit Account No. 01-0431.

Respectfully submitted,

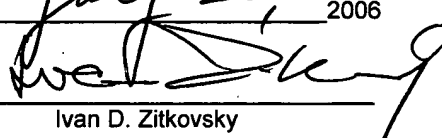


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Ivan D. Zitkovsky